Wage distributions by wage-setting regime

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Abstract

Collective wage contracts impose restrictions on wage-setting. We utilize German linked employer-employee data for blue-collar worker to compute the dispersion of wages and wage components within and across firms under three different wage-setting regimes: Establishments applying sectoral collective contracts, establishments with firm-level contracts and uncovered establishments. The empirical analysis confirms a lower dispersion of wages and wage components for firms applying sectoral collective contracts compared to companies in the other two wage-setting regimes. Implications for policy are discussed.

JEL-Code: J31, J51

Keywords: Wage compression, collective contracts, establishment effects on wages.

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1 Introduction

Most studies of union wage effects analyze the impact of individual union membership on the wage structure (Card 1996, Blau & Kahn 1999, Booth & Bryan 2001, Budd & Na 2000, Card et al. 2003). In West Germany, however, less than one third of employees are union members, but almost 80 percent of workers are covered by collective agreements (Pfeiffer 2003, for the year 2000), since firms applying collective contracts do usually not differentiate across workers with and without union membership.

Our goal is to investigate differences in wage dispersion across three wage-setting regimes in Germany: First establishments applying collective contracts at the industry-level, second establishments with firm-level contracts and third establishments without coverage. For each wage-setting regime, we decompose wages into establishment effects on wages, remuneration of human capital and wage residuals. The main hypothesis is that dispersion of all wage components is smallest within the group of firms applying collective contracts. We conduct the analysis for two different years, one characterized by an economic boom (1990) and one marked by an economic slump (1995).

Our approach requires linked employer-employee data (Hamermesh 1999), that provide information about wages and characteristics at the individual level and about the application of collective contracts at the firm level. Only few investigations on the wage effects of coverage by collective contracts are based on linked employer-employee data. Freeman (1982) compares the wage dispersion within and across firms in the union and non-union sector in different industries for the USA. His main result is that unionized companies have a much lower within and between dispersion of wages than comparable non-covered firms in the same industries. Hartog et al. (2000) assess the magnitudes of wage differentials under corporatist labor relations within the Netherlands. They conclude that in terms of the wage structure it is mainly the regime with firm level bargaining that differs from the collective bargaining and the individual bargaining regime.

For Germany studies are lacking that analyze the impact of firms and individual characteristics on the dispersion of wages in different bargaining regimes. However, a broad consensus exists that the wage structure

across qualifications has not changed substantially in the period from 1975 to 1995, despite high unemployment and decreasing employment rates of less qualified employees (Steiner & Wagner 1998, Möller 1999). Fitzenberger & Franz (2001) recently estimated that nominal wages of less qualified workers would have to decrease by 14 to 37 percent to attain a 50 percent reduction of their unemployment. Büttner & Fitzenberger (1998) find empirical support for suppressed local wage flexibility with respect to regional unemployment particularly for less qualified labor.

Macroeconomic studies argue that wage inequality decreases with trade-union density, bargaining coverage and bargaining centralization and co-ordination (OECD Employment Outlook 1997, Flanagan 1999). Thus the high degree of coverage by collective agreements might be one source of the relatively stable and compressed German wage structure and its presumable impact on the high unemployment of less qualified labor. It is, however, difficult for cross-country studies to establish empirically that bargaining coverage equalizes wages, since the wage distribution is affected by a host of additional causal factors which differ between countries. A differentiation between wage-setting regimes *within a country* could help to clarify if wage compression is in fact more accentuated under collective bargaining regimes than in establishments without coverage.[1] Our analysis shows that such differences exist within Germany.

The paper is structured as follows. Section 2 briefly discusses restrictions imposed by collective contracts and develops testable hypotheses. In section 3 we introduce the data set, the method of analysis and the variables. Section 4 presents the main results of the empirical investigation, which is complemented by a sensitivity analysis (addressing problems of sample restrictions, weighting and self-selection) in Section 5. Section 6 summarizes and draws conclusions.

2 Hypotheses

The literature offers several arguments why unions try to compress the distribution of wages, in particular by attaching wages to job-grades

[1] We are grateful to Daniel Hamermesh for this point.

(Freeman & Medoff 1984, Blau & Kahn 1999, Katz & Autor 1999, Lemieux 1998, Agell 2001). First, by establishing a relatively uniform wage structure within and across firms unions strengthen the solidarity and organizational unity among workers with different skills and job tasks. Second, attaching wages to jobs reduces the opportunities of supervisors to favor or discriminate specific workers. Third, risk-averse union members facing uncertainty about their future wage will be prefer wage compression. Fourth, if union behavior is determined by the median member and the mean wage exceeds the median wage unions will press for higher wage gains for lower paid workers. However, the extent of wage compression induced by industry-level collective agreements is restrained by several factors, four of which will be addressed briefly.

First, skilled workers with relatively deteriorating wage positions might opt out this system of wage determination by either pressing for individual bargains or by forming separate unions (Turner 1952). More recently Acemoglu et al. (2001) argue that skill-biased technical change favoring qualified employees has been an important factor in observed de-unionization, in the diminished importance of collective contracts and in the rise of inequality of wages. However, union-induced wage compression might also increase incentives for employer-provided training of less skilled workers (Acemoglu & Pischke 1999, Böheim & Booth 2003).

Second, firms covered by collective contracts facing collectively negotiated minimum wages and a compressed wage structure can adjust their hiring standards and select workers with high productivity due to unobserved and observed endowments. Formally, this can be modeled as fixing a hiring standard and wage offer simultaneously. Schlicht (2002) captures this idea in an efficiency wage model.

Third, companies facing wage compression can respond by changing their payment systems and, for example, install piece-rate systems for a large proportion of the workforce. In fact, for Germany empirical studies find a positive correlation between works councils and the existence of piece-rate systems, while the correlation between collective contracts and piece-rates is positive, but statistically insignificant (Heywood et al. 1998).

Fourth, Lindbeck & Snower (2001) argue that collective contracts at the industry-level are increasingly inefficient in the ongoing reorganization process, which is characterized by changes from occupational specialization to multi-skilling. This process again favors more educated workers who are more versatile in meeting the requirements of diversified tasks.

As already mentioned, in Germany the application of collective wage contracts at the firm level and not individual union membership has an impact on wages. Under the German system of regional and sectoral bargaining employers' associations and unions conclude collective wage agreements that set minimum wages for member firms of employers' associations, which in rare cases are extended to non-member firms by the Federal Ministry of Labor. In addition, non-members of employers' associations might agree formally or informally to meet the conditions of these sectoral-level agreements or refer to these agreements in individual contracts. As an alternative to the application of industry-wide collective agreements firms can negotiate directly with a union to obtain a firm-level contract. Within this context the preferences of unions for a compressed wage structure motivate the following hypotheses:

First, overall dispersion of log wages should be smallest for workers employed by firms applying collective contracts and highest for workers employed in firms negotiating wages individually. Collectively negotiated wages on the basis of job classifications are minimum wages, standardizing wages between firms in an industrial sector and implementing the goal "equal pay for equal work" heralded by unions. In conjunction with the intention of unions to compress the wage structure this implies a compressed wage distribution for firms applying collective contracts.

Second, we expect limited differences in wage dispersion within companies applying industry-level contracts and applying firm-level contracts, but wage dispersion across companies is expected to be larger for the latter regime. Firm-level contracts may relax restrictions of industry-level collective agreements and adapt the general level of wages within the company to firm-specific conditions (although in general unions refuse to undermine conditions negotiated in industry-level agreements), while at the same time pursuing the goal of wage compression within firms.

Third, wage dispersion across firms should decline if we control for the characteristics of firms' workforce, but it will remain comparatively smaller across companies applying industry-level collective contracts compared to the two other wage-setting regimes. The underlying reason is that wage variation across firms within the three regimes is partly a result of differences in the human capital endowment of firms.

Fourth, the fraction of wage dispersion that can be explained by worker characteristics should be largest in the uncovered regime. Union bargaining policy of pressing for a less dispersed wage structure can be expected to result in relatively low rates of return to human capital.

Fifth, controlling for worker characteristics and for the company, the dispersion of wage residuals can be expected to be highest for firms in the uncovered regime. In accordance with the first hypothesis, this is a result of union's policy to attach wages to jobs and not to individual workers.

3 Data, Method and Variables

The empirical analysis uses the Salary and Wage Structure Survey ("Gehalts- und Lohnstrukturerhebung") of the Statistical Offices of the Federal German States. It is one of the rare databases in Germany combining information on employees and employers (Stephan 2001, gives a detailed description). We have access to the 1990 and 1995 data for Lower Saxony, one of the larger federal states in northwest Germany, in which around 11 percent of all West German employees work. The data are drawn as a two-stage random sample (the percentage of employees surveyed depends on firm size) from all establishments in the entire manufacturing sector and in selected service sectors; establishments as well as employees included in the data set differ in successive surveys.

The data include information on wages, working time and personal characteristics of workers. Most important, each establishment applying a specific collective contract identifies this agreement in the questionnaire. More detailed information on firms – especially on membership in an employer-association, on the existence of a works council and on the internal organization of firms – is, however, not available. In the past, unions have tended to raise wages for low-income full-time workers and their power is

much stronger in manufacturing than in the service sector. Thus, the analysis conducted in this paper is restricted to blue-collar workers from establishments in manufacturing. In our basic estimates we include establishments with 100 to 10.000 employees and a minimum of 5 observations per firm; we modify these size restrictions in Section 5. Furthermore, the analysis is restricted to full-time employees with a working time of at least 30 weekly hours employed during the entire survey year. The remaining data set contains about 20.000 blue-collar workers from more than 500 establishments in each year.

We are interested in standard deviations of wages and wage components under the three wage-setting regimes investigated. The method applied draws on related work using linked employer-employee data by Abowd et al. (2001), Bronars & Famulari (1997) and Bronars et al. (1999), who do, however, not distinguish between different wage-setting regimes. Basically, for each of the three wage-setting regimes a wage equation with fixed establishment effects is estimated,

$$(1) \quad y_{ik} = X_{ik}\beta + \phi_k + u_{ik}.$$

Here y_{ik} is log hourly wages, X_{ik} is a vector of individual characteristics and u_{ik} is an i.i.d. residual of individual i working in firm k, while ϕ_k is a fixed establishment effect on wages paid by firm k. An important advantage of the fixed effects approach is that is does – in contrast to a random effects approach – not require human capital variables and establishment effects on wages to be independent of each other (see for instance Maddala 1997: 633). The estimated ”worker quality index” $X_{ik}\hat{\beta}$ is the log wage individual i can expect to receive in the standard firm. The estimated establishment effect $\hat{\phi}_k$ paid to all workers in firm k is conceived as a ”global” establishment effect on wages (Kramarz et al. 1996), including a ”pure” establishment effect and mean remuneration for unobserved skills within a firm (since our data are cross-sections, we cannot control for individual heterogeneity of workers within firms).

Based on equation (1) the dispersion of log wages can be decomposed into four components:

$$(2) \quad Var(y) = Var(X\hat{\beta}) + Var(\hat{\phi}) + 2 \cdot Cov(X\hat{\beta}, \hat{\phi}) + Var(\hat{u}).$$

The comparison of the right-hand side four components – variance of worker quality indices, establishment effects on wages and residuals as well as the co-variance across worker quality indices and establishment effects – across wage-setting regimes is the main theme of our paper.

It should be noted that in the following section standard deviations instead of variances and correlations instead co-variances are presented, since these can be interpreted conveniently as an approximately average percentage deviation from conditional means and thus as a relative measure of wage dispersion. Standard deviations of worker quality indices are computed across individuals, standard deviations of establishment wage effects are computed across establishments, and standard deviations of wage residuals are computed as the regression's estimated root mean square error. Under the assumption of normality the standard error of an estimated standard deviation $\dot{\sigma}$ can be approximated by $\dot{\sigma}_S = \hat{\sigma}/\sqrt{2N}$ (see for instance Spiegel 1972: 144), where N is the number of observations the standard deviation is based on.

A significant issue is whether differences in standard deviations of wage components in both years and in the three regimes investigated are mainly due to the composition of samples. We cannot address this problem for all wage components, since the firms surveyed differ in both years and, of course, also across wage-setting regimes. However, for each wave of the survey and for each regime we compute the hypothetical standard deviation for the worker quality index that would have resulted under rates of return to human capital in the other wave and regimes, with establishment effects normalized to zero.

Subsequently, the variables are described briefly. The dependent variable is log hourly wages, which is computed not taking into account overtime hours and overtime payments (the inclusion of pay for overtime hours raises hourly wages by about one percent and does not affect the results of the following regression analysis). Wages in 1990 are adjusted to wages in 1995 according to the private consumer price index for West Germany.

In the vector X_{ik} of individual characteristics we include tenure and potential experience (both cubic), years required to achieve the highest educational attainment (abbreviated as schooling), three dummies for basic job grades, dummies for performance pay and a dummy for gender. As usual, schooling and potential experience are interpreted as proxies for general human capital, while tenure – although problems of endogeneity might occur – captures specific human capital. Basic job grades, which classify requirements for jobs as unskilled, semi-skilled, skilled or skilled with special tasks, serve as additional proxy variables for general and specific human capital. In addition, dummies are included for piece-rates, premium-pay and mixed regimes (the standard category are time wages).

4 Main Results

Table 1 presents means and sample sizes for workers (Panel I) and establishments (Panel II). As expected, mean log hourly wages are lowest in establishments without collective or firm-level agreements (1990: 3.01, 1995: 3.05) and highest in firms with firm-level contracts (1990: 3.16, 1995: 3.25). Kernel estimates of log hourly wages are presented in Figure 1 and 2. At a first glance, it seems that the wage distribution under sectoral collective contracts is almost identical to the wage distribution under firm-level contracts. However, as the following analysis shows, the dispersion of estimated wage components differs significantly under both regimes.

Years of schooling differences (means and overall standard deviations) are negligible across the three groups of firms. Mean tenure and experience are lowest in uncovered firms and highest in establishments with a firm-level contract, which might be related to the fact that internal labor markets are more prominent in the latter group of companies. The percentage of women is highest in uncovered firms. Piece rates are most likely to exist in firms applying sectoral collective contracts, while premium wages are mainly used within firms negotiating firm-level contracts.

In our basic sample – consisting of establishments with at least 100 employees – about 70 percent of all establishments remunerate workers according to industry-level collective contracts. The remaining firms are divided equally between establishments with a firm-level contract and es-

tablishment negotiating wages individually. The share of employees and firms in the uncovered regime has increased slightly from 1990 to 1995 - it is well known that during the last decade an increasing number of firms has abandoned industry-level collective bargaining in order to achieve more flexible agreements at the plant or individual level (Lehmann 2001). While mean establishment size is smallest in the uncovered regime, due to the firm-size dependent two-stage sampling procedure the mean number of observations per firm is of approximately equal size across the three regimes. This rules out the possibility that the computed variances of variables are dominated by the fact that random errors are more likely to occur in observing the workforce of smaller establishments.

Table 2 contains our main results, presenting overall standard deviations of log wages, a simple variance decomposition of log wages by establishments and the decomposition of log wages suggested in equation (2). Table 3 summarizes the results from two-sided F-tests on the equality of the standard deviations presented in Table 2 across wage-setting regimes and across years.

As expected in our *first hypothesis*, in both years the overall standard deviation of log wages (Panel I in Table 2 and 3) is lowest across workers employed in firms applying sectoral level collective contracts (1990: 0.19, 1995: 0.20) and highest across workers employed in the uncovered regime (1990: 0.22, 1995: 0.25). It is obvious that overall wage dispersion for blue-collar workers has increased, and this occurred mainly in the uncovered regime.

A simple variance analysis by establishments (Panel II of Table 2 and 3) partly confirms our *second hypothesis*. The idea was that under industry-level collective contracts unions' wage policy compresses wages within as well as across firms, while firm-level contracts compress wages within the firm but endow firms with more degrees in freedom in adjusting their general wage level. Differences in across-firm dispersion are in fact larger across these regimes than differences in within-firm dispersion. The difference is significant, however, only in 1990.

The results for the variance decomposition suggested in equation (2) are documented in Panel III of Table 2 and 3. The underlying estimates of

equation (1) will be discussed briefly at the end of this section. It is evident that the standard deviation of establishment effects on wages conditional on worker characteristics is smaller than the unconditional standard deviation of wages across firms. Again, our *third hypothesis* is only partly confirmed. The standard deviations of establishment effects tends to exhibit lower values for firms with industry-wide agreements compared to both other regimes investigated, but the differences are only partly significant. A recent study shows that employer wage differentials are less dispersed in Germany than in Denmark, France, and the USA (Stephan 2002). The findings imply that country-specific differences may result partly from the fact that industry-level collective contracts smooth conditional establishment effects on wages across firms.

Comparing 1990 to 1995 we observe an increasing standard deviation of establishment effects on wages for firms in the wage-setting regimes of industry-wide and individual agreements. Apparently wage determination has become slightly more flexible in the regime of sectoral wage bargaining. In particular firms in the regime of individual contracts react to persistent high rates of unemployment and the ongoing technological and organizational change by adapting their wages with increasing flexibility.

In accordance with the *fourth and fifth hypothesis* the standard deviations of worker quality indices and wage residuals are largest in the uncovered regime at standard levels of significance. For worker quality indices we compute hypothetical standard deviations for workers with the same characteristics with rates of return for the other wave and for the other regimes. These values are documented in the Panel IV und V of Table 2. While substituting rates of return by years does not lead to notable differences, we find a remarkable effect if rates of return are replaced by regimes: The dispersion of worker quality indices would have been much higher in firms applying sectoral or firm-level contracts if rates of return to human capital are substituted from the uncovered regime, correspondingly, the standard deviation of worker quality indices would have decreased in the uncovered regime with rates of return under collective contracts. *This implies that wage smoothing in firms applying collective contracts is caused to a large extent by compressed returns to observed individual characteristics*.

Finally, some remarks concerning the wage regressions underlying Panel III to V of Table 2 are added. The regressions are documented in Table A.1 in the Appendix (Panel I), which shows that the coefficients for the variables are in most cases significant and have the expected sign. Since the analysis is restricted to blue-collar workers schooling does not have an impact on wages in any regime which is due to the low variance of this variable. To assess the extent of the differences in mean log wages across years and across regimes caused by worker and workplace characteristics we take the following approach: We compute for workers in each year or regime the predicted wages using rates of return estimated for the other year or the other regimes (Panel II and III). The results show that workers (with given characteristics) employed in 1990 would have earned approximately the same average wage under rates of return for 1995 (only workers in firms applying firm-level contracts would have obtained slightly higher earnings). The moderately higher average wages in 1995 are thus mainly a result of different characteristics of the workforce – as Table 1 shows, worker have on average about one year more tenure and potential experience in 1995. Furthermore, on average workers employed under collective or firm-level contracts would have earned less if they would have been remunerated according to individual wage contracts, but more than employees actually working in the regime with individually negotiated wages. Thus, wage differences across regimes are partly due to observed worker and workplace characteristics.

5 Sensitivity Analysis

Table 4 presents a sensitivity analysis to test for the robustness of the results presented in Section 4. The underlying 36 wage regressions are not documented here, but can be obtained by the authors on request.

First, we replicate the analysis for samples of firms with at least 50 or alternatively 250 employees (instead of 100 workers as in our basic version). The second replication has the additional advantage that firms with more than 250 employees apart from rare exceptions dispose of works councils (Addison et al. 2001). Interactions of works councils and coverage are an important element of wage-setting in Germany (Hübler & Jirjahn 2001). The results are presented in Panel I and II of Table 3 and

show that modifying the minimum firm size does have an impact on estimated standard deviations, but that the findings do not change qualitatively.

Second, tenure can be assumed to be endogenous in wage regressions. Attempts to instrument tenure failed because of a lack of identifying variables. We therefore analyze if the results of the regression analysis change significantly if we exclude tenure from our estimates. Panel II of Table 3 reveals that excluding tenure from the wage regressions with fixed establishment effects does not have an impact on the results.

Third, it can be argued that the sampling procedure could influence the results and that furthermore each worker might self-select into the regime where his or her wage is maximized. However, the impact of weighting and self-selection cannot be amended using a fixed effects approach. Therefore, we estimate several variants of the equation

$$(3) \quad y_{ik} = X_{ik}\beta + Z_k + u_{ik}$$

where Z_k is a vector of firm characteristics including firm size (cubic) and sectoral affiliation (9 sector dummies), that is assumed to control for important features of the employer. For these estimates we document standard deviations of wage residuals and of wage components explained by human capital, firm size and sectoral affiliation.

In particular, we estimate equation (3) first by Ordinary Least Squares, second taking into account sampling weights and third correcting for self-selection. The Statistical Office computes weighting factors for each worker that account of the sampling procedure at the first and the second stage of the survey, which we apply in a Weighted Least Squares Model. We correct wage-regressions for workers' self-selection into one of the regimes by estimating a multinomial logit model and including selection terms in the wage regressions (Lee 1983). As explanatory wages in the selection equation we include all variables from the wage equation, with the exception of basic job grades.

The results are documented in Panel IV of Table 3 and show that weighting and controlling for self-selection do not alter standard deviations of estimated wage components compared to the Ordinary Least Squares-

estimates. We interpret this as a hint that suppressing weights and controls for self-selection, which cannot be taken into account in the fixed effects approach underlying equation (2), do not have a substantial impact on the results presented in Section 4.

Finally, the entire analysis presented in Section 4 has also been conducted separately by gender. The results indicate that – similar to individual union membership (Card et al. 2003) – coverage by collective contracts seems to compress wages more strongly for male than for female workers. We suppose as the main underlying reason that women are more concentrated in the lower end of the wage distribution under each wage-setting regime.

6 Summary and Conclusions

The primary focus of our paper is to compare the distribution of blue-collar workers' wages and predicted wage components across firms under different wage-setting regimes in Germany. Using linked employer-employee data we distinguish between establishments not applying an industrial-level or firm level collective wage contract, establishments with sectoral collective contracts and establishments with firm-level contracts. Previous theoretical and empirical work has demonstrated that unions prefer a compressed wage structure and an attachment of wages to job grades. Collective wage contracts impose restrictions on wage determination within and across firms, by setting minimum wages for job grades and compressing the structure of wages across grades and firms.

As was briefly mentioned in the introductory section wage compression might have an impact on the unequal incidence of unemployment across workers with different qualifications. Based on a survey of managers from 801 firms in 2000 Franz & Pfeiffer (2001) argue that wage rigidities for highly skilled workers in Germany are the result of efficiency wage considerations whereas these rigidities in the labor markets for less qualified workers are mainly due to collective contracts. Based on a micro-data set we do also find strong evidence that wage compression for less skilled workers is partly related to the German system of collective bargaining: *Our empirical analysis of German blue-collar workers' wages in 1990 and*

1995 confirms that the dispersion of wages and of wage components is in fact lowest for firms applying industry-level collective contracts.

It is therefore not surprising that the wage bargaining system in Germany is under severe attack (Fitzenberger & Franz 1999), although persuasive empirical findings to demonstrate its inefficiency have been lacking. In our perspective, the German sectoral wage bargaining system has specific advantages like the reduction of transaction costs, the partial internalization of external effects of wage-setting, and its impact on the relationship between management, works councils and workforces which is rarely affected by conflicts about wages. Furthermore, we observe that wage dispersion under industry-level collective contracts has in fact been slightly increasing from 1990 to 1995, which might indicate a reaction to persistent high rates of unemployment and ongoing technological and organizational changes. For these reasons and taking into consideration the political feasibility a strategy to abolish the entire system of collective bargaining is not a promising alternative. Reforms within the system, however, are indispensable.

Membership in an employers' association and the extension of collective contracts to non-union employees within firms is voluntary. However, opting out of the system of collective bargaining is hampered under the current law and regulations by a relatively long validity of the prevailing contract. The alternative to resign from an employers' association should thus be facilitated for firms. Furthermore, concerning wage dispersion, an efficient opening should be enacted in the Collective Bargaining Act and be obligatory for all collective contracts with the objective to increase the flexibility and plant-level orientation of wage-setting and to enhance the possibility of differentiating wages within sectoral agreements. On the basis of an opening clause management and a majority of workers and/or the works council should be able to deviate from the terms of a collective agreement without approval from the employers' associations and the union in severe economic conditions of the firm. Both modifications would enhance competition between the different wage-setting regimes constituting the German bargaining system.

References

Abowd, J.M., Kramarz, F., Margolis, D.N. and Troske, K.R. (2001): The Relative Importance of Employer and Employee Effects on Compensation: A Comparison of France and the United States, Journal of the Japanese and International Economies 15, 419-436.

Acemoglu, D., Pischke, J.-S. (1999): The Structure of Wages and Investent in General Training, Journal of Political Economy 107, 539-572.

Acemoglu, D., Aghion, P. and Violante, G.L. (2001): Deunionization, Technical Change and Inequality, Carnegie-Rochester Conference Series on Public Policy 55.

Addison, J.T., Schnabel, C. and Wagner, J. (2001): Works Councils in Germany: Their Effect on Firm Performance, Oxford Economics Papers 53, 419-445.

Agell, J. (2001): Warum haben wir rigide Arbeitsmärkte? Rent-seeking versus Soziale Sicherung, Perspektiven der Wirtschaftspolitik 2, 363-381.

Blau, F.D. and Kahn, L.M. (1999): Institutions and Laws in the Labor Market, in: Ashenfelter, O. and Card, D. (Eds.): Handbook of Labor Economics, Vol. 3A, Amsterdam: Elsevier, 1399-1461.

Böheim, R. and Booth, A.L. (2003): Trade Union Presence and Employer-provided Training in Britain, mimeo.

Booth, A.L. and Bryan, M.L. (2001): The Union Membership Wage-Premium Puzzle: Is there a Free Rider Problem?, ISER Working Papers 2001-09, Institute for Social and Economic Research, University of Essex.

Bronars, S. and Famulari, M. (1997): Wage, Tenure, and Wage Growth Variation Within and Between Establishments, Journal of Labor Economics 15, 285-317.

Bronars, S., Famulari, M., Bingley, P. and Westergard-Nielsen, N. (1999): Employer Wage Differentials in the United States and Denmark, in: Haltiwanger, J.C., Lane, J.I., Spletzer, J.R., Theeuwes, J.J.M. and Troske, K.R. (eds.): The Creation and Analysis of Employer-Employee Matched Data, Amsterdam: Elsevier, 205-230.

Budd, J.W. and Na, I.-G. (2000): The Union Membership Wage Premium for Employees Covered by Collective Bargaining Agreements, Journal of Labor Economics 18, 783-807.

Büttner, T. and Fitzenberger, B. (1998): Central Wage Bargaining and Regional Wage Rigidity: Evidence from the Entire Wage Distribution, ZEW Discussion Paper No. 98 – 39, Mannheim.

Card, B. (1996): The Effect of Unions on the Structure of Wages: A Longitudinal Analysis, Econometrica 64, 957-979.

Card, D, Lemieux, T. and Riddell, W.C. (2003): Unionization and Wage Inequality: A Comparative Study of the U.S., the U.K., and Canada, NBER Working Paper 9473.

Fitzenberger, B. and Franz, W. (1999): Industry-Level Wage Bargaining: A Partial Rehabilitation – The German Experience, Scottish Journal of Political Economy 46, 437-457.

Fitzenberger, B. and Franz, W. (2001): Jobs. Jobs? Jobs! Orientierungshilfen fuer den Weg zu mehr Beschäftigung, in: Franz, W., Hesse, H., Ramser. H.J. and Stadler, M. (eds.): Wirtschaftspolitische Herausforderungen an der Jahrhundertwende, Wirtschaftswissenschaftliches Seminar Ottobeuren, Vol. 30, Tübingen, Mohr Siebeck, 3-41.

Flanagan, R.J. (1999): Macroeconomic Performance and Collective Bargaining: An International Perspective, Journal of Economic Literature 37, 1150-1175.

Franz, W. and Pfeiffer, F. (2001): Tarifbindung und die ökonomische Rationalität von Lohnrigiditäten, ZEW Discussion Paper No. 01 – 01, Mannheim.

Freeman, R.B. (1982): Union Wage Practices and Wage Dispersion Within Establishments, Industrial and Labor Relations Review 36, 3-21.

Freeman, R.B. and Medoff, J.L. (1984): What Do Unions Do? New York: Basic Books.

Hamermesh, D.S. (1999): LEEping into the Future of Labor Economics: The Research Potential of Linking Employer and Employee Data, Labor Economics 6, 25-41.

Hartog, J., Leuven, E. and Teulings, C. (2000): Wages and the Bargaining Regime in a Corporatist Setting, Tinbergen Institute Discussion Paper 2000-13/3.

Heywood, J.S., Hübler, O. and Jirjahn, U. (1998): Variable Payment Schemes and Industrial Relations: Evidence from Germany, Kyklos 51, 237-257.

Hübler, O. and Jirjahn, U. (2001): Works Councils and Collective Bargaining in Germany: the Impact on Productivity and Wages, Institute for the Study of Labor Discussion Paper 322, Bonn.

Katz, L.F. and Autor, D.H. (1999): Changes in the Wage Structure and Earnings Inequality, in: Ashenfelter, O. and Card, D. (Eds.): Handbook of Labor Economics, Vol. 3A, Amsterdam: Elsevier, 1483-1555.

Kramarz, F., Lollivier, S. and Pelé, L.-P. (1996): Wage Inequalities and Firm-Specific Compensation Policies in France, Annales d'Économie et de Statistique, 41/42, 2369-386.

Lee, L.F. (1983): Generalized Econometric Models with Selectivity, Econometrica 51, 507-512.

Lehmann, K. (2001): Stabilität und Veränderung der Flächentarifbindung von Arbeitgebern in Deutschland, Münster, LIT Verlag.

Lemieux, T. (1998): Estimating the Effects of Unions on Wage Inequality in a Panel Data Model with Comparative Advantage and Nonrandom Selection, Journal of Labor Economics 16, 261-291.

Lindbeck, A. and Snower, D.J. (2001): Centralized Bargaining and Reorganized Work: Are they Compatible?, European Economic Review 45, 1851-1875.

Maddala, W.H. (1997): 3rd edition, Econometric analysis, Prentice Hall.

Möller, J. (1999): Die Entwicklung der qualifikatorischen Lohn- und Beschaeftigungsstruktur in Deutschland, Jahrbuecher fuer Nationaloekonomie und Statistik 219, 8-31.

OECD (1997): Employment Outlook, Paris: OECD.

Pfeiffer, F. (2003): Lohnrigiditäten in gemischten Lohnbildungssystemen, Mannheim: Nomos.

Schlicht, E. (2002): Hiring Standards and Market Clearing, Institute for the Study of Labor Discussion Paper 481, Bonn.

Spiegel, M.R. (1972): Statistics, New York: McGraw-Hill International Book Company.

Steiner, V. and Wagner, K. (1998): Has Earnings Inequality in Germany Changed in the 1980s?, Zeitschrift fuer Wirtschafts- und Sozialwissenschaften 118, 29-59.

Stephan, G. (2001): The Lower Saxonian Salary and Wage Structure Survey – Linked Employer-Employee Data from Official Statistics, Schmollers Jahrbuch: Journal of Applied Social Science Studies 121, 267-274.

Stephan, G. (2002): Employer Wage Differentials in Germany: A Comparative Note, Labour: Review of Labour Economics and Industrial Relations 16, 491-512.

Turner, H.A. (1952): Trade Unions, Differentials and the Levelling of Wages, Manchester School of Economics and Social Studies 21, 227-282.

Figures, Tables and Appendix

Figure 1: Kernel estimates of the distribution of log hourly wages in 1990

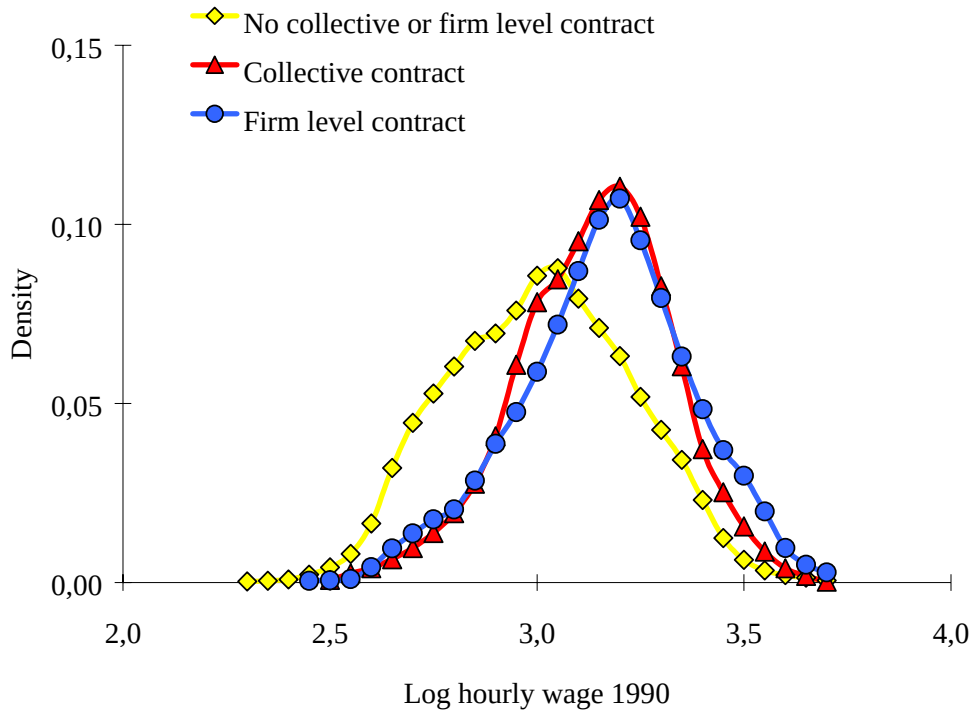

Figure 2: Kernel estimates of the distribution of log hourly wages in 1995

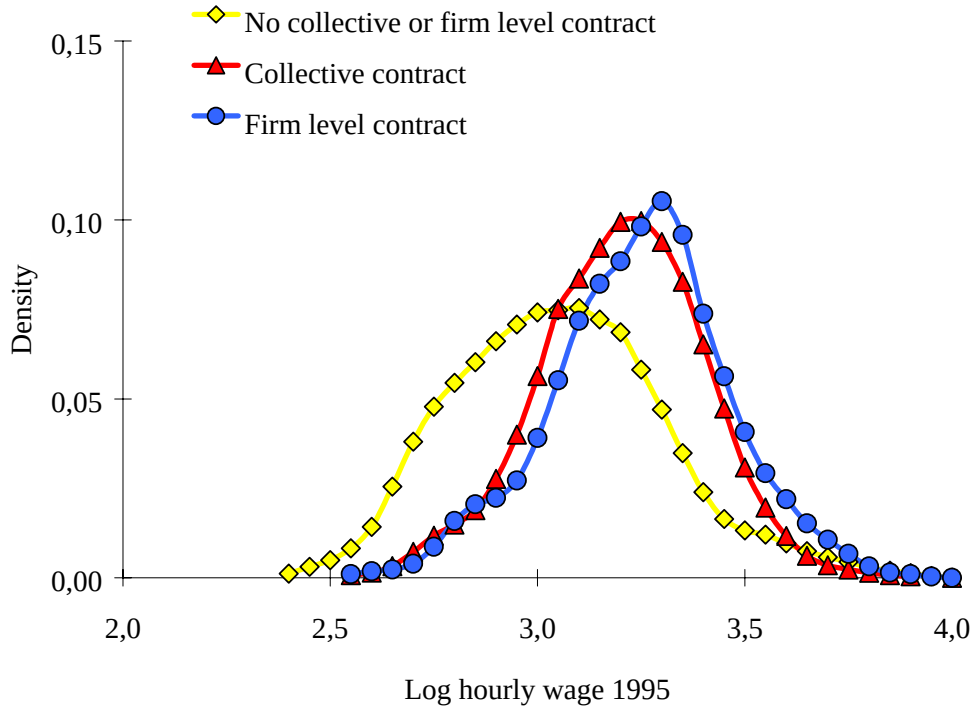

Table 1: Means and sample size

		1990			1995		
		C	F	N	C	F	N
I	**Worker characteristics**						
	Log hourly wages	3,14	3,16	3,01	3,20	3,25	3,05
	Schooling	11,3	11,2	11,2	11,3	11,4	11,3
	Tenure	10,6	12,5	7,3	11,5	13,4	8,0
	Potential experience	20,6	21,6	17,9	21,8	22,4	19,8
	Female*	0,20	0,16	0,29	0,18	0,15	0,27
	Unskilled*	0,15	0,18	0,16	0,18	0,17	0,13
	Semi-skilled*	0,34	0,29	0,36	0,32	0,25	0,37
	Skilled*	0,29	0,33	0,38	0,32	0,34	0,47
	Skilled with special tasks*	0,22	0,20	0,10	0,18	0,24	0,03
	Time pay*	0,64	0,72	0,70	0,65	0,61	0,81
	Premium pay*	0,12	0,18	0,03	0,12	0,25	0,06
	Piece rate*	0,20	0,01	0,12	0,18	0,06	0,06
	Mixed pay*	0,04	0,08	0,14	0,05	0,08	0,06
	Number of workers	17.373	3.339	2.367	17.268	3.288	3.160
II	**Establishment characteristics**						
	Energy & water*	0,02	0,19	0,00	0,03	0,19	0,02
	Mining*	0,03	0,06	0,00	0,02	0,14	0,02
	Chemicals & mineral oil*	0,06	0,03	0,07	0,08	0,08	0,04
	Rubber*	0,08	0,10	0,08	0,11	0,04	0,07
	Soil & ceramics & glass*	0,04	0,10	0,03	0,05	0,09	0,03
	Metal*	0,06	0,07	0,03	0,08	0,10	0,11
	Construction of machines & vehicles*	0,28	0,10	0,18	0,19	0,13	0,21
	Electrotechnics & fine mechanics & optics*	0,19	0,06	0,19	0,11	0,04	0,11
	Wood & paper & printings*	0,12	0,07	0,14	0,13	0,05	0,08
	Leather & textiles*	0,06	0,06	0,12	0,06	0,00	0,09
	Food*	0,07	0,18	0,16	0,14	0,15	0,23
	Firm size	619	560	285	446	455	261
	Observations per firm	48	46	32	40	42	31
	Number of establishments	364	72	73	429	79	101

C = Application of collective contract at the industry-level.
F = Application of firm-level contract.
N = No application of collective or firm-level contract.
Only workers from establishments with at least 100 employees.
*) Dummy variables.

Table 2: Standard deviations (SD) and their standard error (in parenthesis) for log wages and estimated log wage components

		1990			1995		
		C	F	N	C	F	N
I	**Overall SD**	0,188	0,209	0,219	0,201	0,211	0,254
		(0,001)	(0,003)	(0,003)	(0,001)	(0,003)	(0,003)
II	**Variance analysis by establishments**						
	SD across establishments	0,137	0,165	0,153	0,148	0,159	0,202
		(0,005)	(0,014)	(0,013)	(0,005)	(0,013)	(0,014)
	SD within establishments	0,129	0,131	0,157	0,135	0,141	0,155
		(0,001)	(0,002)	(0,002)	(0,001)	(0,002)	(0,002)
III	**Regression with fixed establishment effects**						
	SD establishment effects	0,102	0,133	0,103	0,121	0,134	0,146
		(0,004)	(0,011)	(0,009)	(0,004)	(0,011)	(0,010)
	SD residuals	0,091	0,098	0,108	0,103	0,110	0,119
		(0,000)	(0,001)	(0,002)	(0,001)	(0,001)	(0,002)
	SD worker quality index	0,120	0,110	0,141	0,111	0,115	0,130
		(0,001)	(0,001)	(0,002)	(0,001)	(0,001)	(0,002)
	Corr. (worker quality, establishment effect)	0,183	0,307	0,198	0,223	0,189	0,277
IV	**SD worker quality indices with**						
	rates of return as in 1990	0,120	0,110	0,141	*0,113*	*0,120*	*0,125*
		(0,001)	(0,001)	(0,002)	(0,001)	(0,001)	(0,002)
	rates of return as in 1995	*0,119*	*0,113*	*0,154*	0,111	0,115	0,130
		(0,001)	(0,001)	(0,002)	(0,001)	(0,001)	(0,002)
V	**SD worker quality indices with**						
	rates of return as under C	0,120	*0,111*	*0,116*	0,111	*0,116*	*0,096*
		(0,001)	(0,001)	(0,002)	(0,001)	(0,001)	(0,001)
	rates of return as under F	*0,124*	0,110	*0,121*	*0,111*	0,115	*0,090*
		(0,001)	(0,001)	(0,002)	(0,001)	(0,001)	(0,001)
	rates of return as under N	*0,145*	*0,137*	0,141	*0,149*	*0,154*	0,130
		(0,001)	(0,002)	(0,002)	(0,001)	(0,002)	(0,002)

C = Application of collective contract at the industry-level.
F = Application of firm-level contract.
N = No application of collective or firm-level contract.
Only workers from establishments with at least 100 employees.
Cursive types mark hypothetical predicted values.
The underlying wage regressions for Panel III to V are documented in Table A.1 in the Appendix.

Table 3: Probability values from two-sided F-tests on the equality of standard deviations

		1990			1995			1990-1995		
		C-F	C-N	F-N	C-F	C-N	F-N	C	F	N
I	**Overall SD**	0,00	0,00	0,01	0,00	0,00	0,00	0,00	0,44	0,00
II	**Variance analysis by establishments**									
	SD across establishments	0,04	0,21	0,54	0,42	0,00	0,03	0,10	0,77	0,01
	SD within establishment	0,28	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,47
III	**Regression with fixed establishment effects**									
	SD establishment effects	0,01	0,93	0,03	0,23	0,01	0,40	0,00	0,95	0,00
	SD residuals	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
	SD worker quality index	0,00	0,00	0,00	0,01	0,00	0,00	0,00	0,00	0,00

C = Application of collective contract at the industry-level.
F = Application of firm-level contract.
N = No application of collective or firm-level contract.
Only workers from establishments with at least 100 employees.

Table 4: Sensitivity analysis

		1990			1995		
		C	F	N	C	F	N
I	***Establishments with at least 50 employees***						
	Overall SD	0.188	0.215	0.221	0.201	0.210	0.248
	Variance analysis by establishments						
	SD across establishments	0.136	0.173	0.158	0.149	0.160	0.194
	SD within establishment	0.130	0.131	0.156	0.135	0.140	0.159
	Regressions with fixed establishment effects						
	SD establishment effects	0.104	0.145	0.105	0.121	0.137	0.139
	SD residuals	0.092	0.098	0.107	0.103	0.110	0.120
	SD worker quality index	0.120	0.110	0.142	0.111	0.116	0.134
	Corr. (worker quality index,establishment effects)	0.170	0.328	0.231	0.216	0.196	0.232
II	***Establishments with at least 250 employees***						
	Overall SD	0.181	0.194	0.229	0.194	0.200	0.272
	Variance analysis by establishments						
	SD across establishments	0.128	0.147	0.163	0.138	0.150	0.236
	SD within establishment	0.129	0.131	0.164	0.136	0.140	0.143
	Regressions with fixed establishment effects						
	SD establishment effects	0.084	0.119	0.120	0.099	0.113	0.180
	SD residuals	0.092	0.098	0.111	0.104	0.112	0.111
	SD worker quality index	0.119	0.104	0.143	0.111	0.116	0.123
	Corr. (worker quality index,establishment effects)	0.187	0.219	0.258	0.228	0.182	0.389
III	***Establishments with at least 100 employees***						
	Regressions with fixed establishment effects, excluding tenure						
	SD establishment effects	0.103	0.134	0.105	0.122	0.134	0.151
	SD residuals	0.092	0.098	0.112	0.104	0.111	0.122
	SD worker quality index	0.118	0.108	0.138	0.109	0.114	0.125
	Corr. (worker quality index,establishment effects)	0.180	0.291	0.189	0.213	0.183	0.226
IV	***Establishments with at least 100 employees***						
	Regressions with controls for firm size and sector						
	SD residuals	0.119	0.109	0.132	0.135	0.136	0.155
	SD explained wage component	0.145	0.178	0.174	0.148	0.162	0.202
	Weighted regressions with controls for firm size and sector						
	SD residuals	0.119	0.110	0.133	0.136	0.137	0.155
	SD explained wage component	0.144	0.178	0.173	0.147	0.158	0.201
	Regressions with controls for firm size, sector and self-selection						
	SD residuals	0.119	0.109	0.132	0.135	0.135	0.155
	SD explained wage component	0.145	0.178	0.174	0.149	0.163	0.201
V	**Number of workers by size restriction**						
	Establishments with at least 100 employees	17373	3339	2367	17268	3288	3160
	Establishments with at least 50 employees	18380	3500	2708	18288	3416	3977
	Establishments with at least 250 employees	13620	2543	1097	11629	2287	1497
	Number of establishments by size restriction						
	Establishments with at least 100 employees	364	72	73	429	79	101
	Establishments with at least 50 employees	415	81	90	494	87	141
	Establishments with at least 250 employees	213	43	23	218	40	29

C = Application of collective contract at the industry-level.
F = Application of firm-level contract.
N = No application of collective or firm-level contract.

Table A.1: Log wage regressions with fixed establishment effects on wages

		1990			1995		
		C	F	N	C	F	N
I	Schooling / 10	0.041	-0.001	-0.008	0.056	0.051	0.096
	Tenure / 10	0.068**	0.073**	0.171**	0.081**	0.013	0.172**
	(Tenure / 10)^2	-0.030**	-0.031**	-0.092**	-0.032**	0.005	-0.089**
	(Tenure / 10)^3	0.005**	0.004**	0.016**	0.005**	-0.001	0.015**
	Potential experience / 100	0.049**	0.072**	0.075**	0.046**	0.065*	0.112**
	(Potential experience / 10)^2	-0.013**	-0.030**	-0.022	-0.013**	-0.019	-0.038**
	(Potential experience / 10)^3	0.001	0.004**	0.002	0.001	0.001	0.004*
	Semi-skilled	0.083**	0.071**	0.076**	0.073**	0.082**	0.102**
	Skilled	0.171**	0.169**	0.160**	0.160**	0.159**	0.165**
	Skilled, with special tasks	0.241**	0.233**	0.218**	0.242**	0.264**	0.286**
	Premium pay	0.045**	0.093**	-0.013	0.059**	0.021	0.091**
	Piece rate	0.074**	0.126**	0.108**	0.077**	0.069**	0.059**
	Mixed pay	0.060**	0.036**	0.039**	0.046**	0.074**	0.064**
	Female	-0.111**	-0.118**	-0.175**	-0.091**	-0.087**	-0.166**
	Constant	2.891**	2.956**	2.826**	2.926**	2.968**	2.700**
	Number of workers	17373	3339	2367	17268	3288	3160
	Number of establishments	364	72	73	429	79	101
	Corrected R^2	0.76	0.78	0.75	0.74	0.73	0.78
II	**Predicted wage with**						
	rates of return as in 1990	3.14	3.16	3.01	*3.14*	*3.19*	*3.02*
	rates of return as in 1995	*3.20*	*3.23*	*3.05*	3.20	3.25	3.05
III	**Predicted wage with**						
	rates of return as under C	3.14	*3.14*	*3.11*	3.20	*3.22*	*3.16*
	rates of return as under F	*3.17*	3.16	*3.13*	*3.23*	3.25	*3.19*
	rates of return as under N	*3.06*	*3.05*	3.01	*3.11*	*3.14*	3.05

C = Application of collective contract at the industry-level.
F = Application of firm-level contract.
N = No application of collective or firm-level contract.
Only workers from establishments with at least 100 employees.
Cursive types mark hypothetical predicted values.
The corrected R^2 refers to the explanatory power of individual characteristics and establishment effect.
*) Significant at $\alpha = 0.05$.
**) Significant at $\alpha = 0.01$.

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